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10/560,073

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Takashi Masuko

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EXAMINER

DESAI, ANISH P

ART UNIT

PAPER NUMBER

1787

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/560,073 | Applicant(s) MASUKO ET AL. | |
| | Examiner ANISH DESAI | Art Unit 1787 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 May 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,3,6-18 and 21-33 is/are pending in the application.
- 4a) Of the above claim(s) 3,8,10-14,21-24 and 27-32 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2,6,7,9,15-18,25,26 and 33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>05/19/10</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's arguments in response to the Office action (OA) dated 01/19/10 have been fully considered.
2. All of the previous art rejections are maintained.
3. A complete English translation of Fujii (JP 2000-104040) is provided.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 2, 6, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii (JP 2000-104040) in view of Kikkawa et al. (US 2002/0048726A1).**

5. With respect to claim 33, Fujii discloses a die bonding adhesive layer that comprises polyimide resin and epoxy resin (abstract, 0012, and 0019), wherein the polyimide resin has Tg of 30 to 80°C (abstract and 0013). Further, at 0019 Fujii discloses that the epoxy resin is used in the amount of 0.1 to 200 weight section

Art Unit: 1787

(equated to parts by weight) relative to 100 parts by weight of polyimide. As to the claim limitation of the polyimide is contained at 50% by weight or more of a total polyimide resin, it is noted that since Fujii discloses a polyimide resin, it is clear that said polyimide is contained at more than 50% by weight of the total polyimide resin.

6. With respect to claim 33, Fujii is silent as to teaching the weight average molecular weight of the polyimide as presently claimed.

7. However, Kikkawa discloses a polyimide precursor and polyimide obtained from the polyimide precursor (abstract, 0001 and 0028) that can be used as surface coating films for semiconductor devices (0001). Further, the polyimide of Kikkawa has adhesive properties (0139). Additionally, at 0028, Kikkawa discloses "The weight average molecular weight of the polyimide of the present invention is 10,000 to 200,000, preferably 20,000 to 60,000. The polyimide of the present invention can easily be obtained in the form of film of a complicated shape by use of the polyimide precursor of the present invention and hence is suitable for the protective film of a semiconductor device, etc."

8. It is noted that the Fujii's adhesive layer is applied on the surface of semiconductor wafer (abstract). Similarly, the adhesive of Kikkawa is also applied as a protective film on the wafer (0001) and it can be obtained in the form of film of complicated shape (0028).

Art Unit: 1787

9. Based on the above, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the polyimide having the weight average molecular weight including that of the presently claimed in the invention of Fujii, motivated by the desire to suitably use the polyimide that can be easily obtained in the form of film of complicated shape.

10. As to the claimed properties of the SP value of polyimide, "at least one of the polyimide resins being obtained by reacting a diamine and an acid dianhydride satisfying the condition where as difference...DSC is 10°C or smaller", tan delta peak temperature and the flow amount of the adhesive, it is reasonable to presume that said properties are necessarily present in the polyimide resin and adhesive of Fujii as modified by Kikkawa.

11. The support for said presumption is based on the fact that the polyimide of Fujii as modified by Kikkawa has Tg and weight average molecular weight that is claimed by the present invention. Additionally, the adhesive of Fujii as modified by Kikkawa includes polyimide and epoxy resin, wherein the epoxy resin is contained in the same amount including that of the presently claimed. Further, the polyimide resin of Fujii formed by tetracarboxylic acid dianhydride and diamine (0013-0015). Likewise applicant's polyimide is formed by reaction between tetracarboxylic acid dianhydride and diamine.

Art Unit: 1787

12. Based on the above, the polyimide and the adhesive of Fujii as modified by Kikkawa and that of applicant are similar. Therefore, the aforementioned properties would necessarily be present in the invention of Fujii as modified by Kikkawa.

13. With respect to claim 2, the epoxy resin of Fujii as shown by Chemical Formula 1 in 0021 is tri functional epoxy resin.

14. With respect to claim 6, at 0023, Fujii discloses hardening agent (curing agent) for epoxy resin.

15. Claims 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii (JP 2000-104040) in view of Kikkawa et al. (US 2002/0048726A1) as applied to claim 6 above, and further in view of Takashi (JP 11-140386).

16. It is noted that while Fujii at 0023 discloses phenol based curing agent, Fujii is silent as to teaching the specific phenol-based compound as presently claimed.

17. However, Takashi discloses adhesive film comprising polyimide and epoxy resin (claims 1-4 of Takashi on page 2). Further, at 0039 on page 19, Takashi discloses epoxy curing agents such a phenolic compound having at least two phenolic hydroxy groups and having molecular weight of 400-1500.

18. Based on the above, it would have been obvious to select the phenolic compound of Takashi which reads on the phenol compound of the presently claimed invention, in the adhesive of Fujii, since it has been held that selection of a known

Art Unit: 1787

material based on its suitability for its intended use establishes a *prima facie* case of obviousness.

19. With respect to claim 9, it is submitted that this claim requires that the epoxy resin curing agent be more in stoichiometric proportion than the epoxy resin. It is reasonable to presume that said feature would necessarily present in the invention of Fujii as modified by Kikkawa and Takashi given that Fujii as modified by Kikkawa and Takashi discloses similar epoxy resin (tri-functional) and phenol based curing agent (2 or more hydroxyl group in a molecule) as presently claimed. Alternatively, it would have been obvious to select the equivalent ratio as presently claimed so as to fully react epoxy resin in the end product.

20. **Claims 15, 16, 18, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii (JP 2000-104040) in view of Kikkawa et al. (US 2002/0048726A1) as applied to claim 33 above, and further in view of Nakaso et al. (US 5,690,837).**

21. Fujii is silent as to teaching claims 15, 16, 18, and 26.

22. However, Nakaso discloses a process for producing multilayered circuit board which utilizes adhesive layer (e.g. polyimide) (abstract and column 4 lines 48-50).

Further, the adhesive layer of Nakaso comprises filler such as alumina, silica, aluminum

Art Unit: 1787

nitride (insulating filler) and said filler is present in the amount 50% by volume or less (column 7 lines 13-15).

23. It would have been obvious to select the filler such as that of claimed by applicant's present invention which is taught by Nakaso in the adhesive of Fujii, motivated by the desire to provide suitable adhesiveness and fluidity to the adhesive layer (column 7 lines 17-20 of Nakaso).

24. Claims 17 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii (JP 2000-104040) in view of Kikkawa et al. (US 2002/0048726A1) and further in view of Nakaso et al. (US 5,690,837) as applied to claim 15 above, and further in view of Hotta et al. (US 5,904,505).

25. Fujii is silent as to teaching claims 17 and 25.

26. However, Hotta discloses a process for producing a metal foil-covered semiconductor device which utilizes an adhesive that fixes a metal foil to the semiconductor device (column 5 lines 15-20). Further, the adhesive of Hotta includes thermosetting resins including polyimide resin (column 6 lines 29-31). Additionally, the adhesive of Hotta includes filler in order to effectively control the adhesion force (column 5 lines 30-35). Additionally, as shown in Examples 3 and 4 of Hotta the filler has average particle diameter of 10 μm or smaller (e.g. 0.8 μm in Example 3) and maximum diameter is 25 μm or smaller (e.g. 20 μm in Example 3).

Art Unit: 1787

27. Based on the above, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the filler having the diameter as presently claimed which is taught by Hotta in the adhesive of Fujii, motivated by the desire to effectively control the adhesive force of Fujii's adhesive.

Response to Arguments

28. Applicant's arguments filed on 05/19/10 have been fully considered but they are not persuasive.

29. With respect to applicant's arguments (see second full paragraph on page 2) against the 35 USC Section 103(a) rejections based on Fuji (JP 2000-104040) in view of Kikkawa et al. (US 2002/0048726A1), the Examiner respectfully disagrees for the following reasons:

30. As to applicant's assertion "That is, even if polyimide has a Tg and weight average molecular weight as in the present claims, the polyimide would not [underline omitted by the Examiner] necessarily have the SP value as in the present claims" (see second full paragraph on page 2), the Examiner submits that applicant's arguments are presented without any factual evidence in the form of a proper affidavit/declaration on the record. As set forth in MPEP 716.02(g), "the reason for requiring evidence in a

Art Unit: 1787

declaration or affidavit form is to obtain the assurances that any statements or representations made are correct, as provided by 35 U.S.C. 24 and 18 U.S.C. 1001".

As such, the aforementioned arguments are based on consul's personal opinion (MPEP 2164.06(C)(V)). Accordingly, applicant's arguments are not found persuasive.

31. As to applicant's arguments on pages 2-4 of the amendment, referring to Comparative Example 1 in the specification, the Examiner respectfully submits following;

32. Applicant points to evidence in the specification (e.g. Comparative Example 1) and asserts "As to this evidence in Applicant's specification...the adhesive film of Comparative Example 1 includes a polyimide resin having an SP value, Tg and weight-average molecular weight within the scope of these properties in the present claims, and contains an epoxy resin in an amount as in the present claims. However [underline omitted by the Examiner], the polyimide resin in Comparative Example 1 was obtained by reacting a diamine and acid dianhydride which do not satisfy the condition where a difference between a heat generation initiating temperature and a heat generation peak temperature by means of DSC is 10°C or smaller; specifically, the difference thereof is 11.1°C in Comparative Example 1. A flow amount of the adhesive film of the Comparative Example 1 is 2810 µm, outside [underline omitted by the Examiner] the scope set forth in the present claims..." (see first full paragraph on page 4).

Art Unit: 1787

33. The Examiner respectfully submits that upon reviewing the Comparative Example 1 in applicant's specification (see paragraphs 0129 and Table 2 in the US Pg Pub of this application), the only difference seen is that the phthalic dianhydride used to make "polyamide A' " of Comparative Example 1 is **unpurified**. It is noted that applicant's inventive examples use acetic anhydride as purifier (see 0128 in US Pg Pub of this application and Example 2). It is noted that Fuji, also discloses use of acetic anhydride (see paragraph 0018). As such, Fuji's polyimide is identical to that of applicant's polyimide. Therefore, it is reasonable to presume that the difference between a heat generation initiating temperature and a heat generation peak temperature by means of DSC is 10°C or smaller, and the flow amount are necessarily present in the invention of Fuji.

34. As to applicant's arguments (see pages 5, 6, and 8) that the adhesive film of the presently claimed invention has both low temperature laminating property and resistance to re-flowability, the Examiner submits following:

35. It is noted that Fuji discloses resistance to re-flow (see paragraph 0042). Additionally, given that Fuji in combination with Kikkawa discloses the adhesive film as presently claimed, it is clear that the adhesive film of Fuji as modified by Kikkawa would intrinsically possess both low temperature laminating property and resistance to re-flow as does the adhesive film of the present invention.

Art Unit: 1787

36. With respect to applicant's arguments "Furthermore, it is respectfully submitted that the teachings of the applied references would have...and, moreover, wherein the epoxy resin contains a tri-or more functional epoxy resin and/or epoxy resin which is solid at room temperature (note claim 2); and/or wherein the adhesive film also contains an epoxy resin curing agent (see claim 6, and claims dependent thereon) or a filler (see claim 15), and amount thereof (see claim 18)." (last full paragraph on page 5), the Examiner respectfully submits following:

37. As to claim 2, epoxy resin of Fuji as shown by Chemical Formula 1 in 0021 is a tri-functional epoxy. With respect to claim 6, at 0023, Fuji discloses hardening agent for epoxy. Further, with respect to claims 15 and 18, as set forth on page 8, section 23 of the previous OA, the prior art of Nakaso et al. (US 5,690,837) is relied upon to render obvious claims 15 and 18. Accordingly, applicant's arguments are not found persuasive.

38. On pages 8 (see fourth full paragraph), applicant has asserted that "The Tg of the polyimide resin is an important feature of the adhesive film of the present invention. With a Tg as in the present claims, the adhesive film is allowed to have a tan δ peak temperature of -20 to 60°C, and to achieve a low temperature laminating property." The Examiner notes that the polyimide of Fuji has Tg of 30°C to 80°C (see 0013). As such, based on applicant's assertion above (i.e. with the Tg as in the present claims, the

Art Unit: 1787

adhesive film is allowed to have a tan δ peak temperature of -20 to 60°C), the polyimide of Fuji would necessarily have the tan δ peak temperature as presently claimed

39. With respect to applicant's arguments against the prior art of Fuji (see first full paragraph on page 9), the Examiner submits that, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

40. As to applicant's arguments against the prior art of Kikkawa (see first full paragraph on page 10), the Examiner respectfully submits that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Further, the Examiner notes that applicant's arguments (specifically arguments relating to SP value and tan δ peak temperature) are submitted without any factual evidence on the record.

41. With respect to applicant's arguments (see pages 11-12) against the prior art of Takashi (JP 11-1403896), Nakaso et al. (US 5,690,837), and Hotta et al. (US 5,904,505), the Examiner respectfully submits that while the aforementioned prior art references do not disclose all the features of the present claimed invention, said references are used as teaching reference, and therefore, it is not necessary for these

Art Unit: 1787

secondary references to contain all the features of the presently claimed invention, *In re Nieveit*, 482 F.2d 965, 179 USPQ 224, 226 (CCPA 1973), *In re Keller* 624 F.2d 413, 208 USPQ 871, 881 (CCPA 1981). Rather these references teach a certain concept, namely Takashi is used for claims 7 and 9, Nakaso is used for claims 15, 16, 18, and 26, and Hotta is used for claims 17 and 25, and in combination with the primary reference, discloses the presently claimed invention. Accordingly, applicant's arguments are not found persuasive.

Conclusion

42. **The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. (A) JP 2002-158276A is related to PSA sheet for wafer attachment (see Machine translation). (B) JP 2002-121530A relates to polyimide resin (see Machine translation). (C) JP 2001-303015A relates to adhesive film containing oxetane compound and a curing agent (see Machine translation). These references are cited on the English translation of Japanese Official Action issued on 08/18/09 that is cited on the IDS of 05/19/10.**

43. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

44. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

Art Unit: 1787

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

45. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANISH DESAI whose telephone number is (571)272-6467. The examiner can normally be reached on Monday-Friday, 9:00AM-5:30PM.

46. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Callie Shosho can be reached on 571-272-1123. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

47. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

Art Unit: 1787

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. D./

Examiner, Art Unit 1787

/Callie E. Shosho/

Supervisory Patent Examiner, Art Unit 1787